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desired on light or superficial soils. It seems to us that this amounts to little more than saying that a vigorous vine cannot be grown on a poor soil; the fact being that the American vines for this particular purpose have made their way against much opposition, and remain to-day the best solution, all things considered, of the Phylloxera question.

The commission finally concluded that the prize of 300,000 francs be still reserved, but maintained. It seems to us that some disposition should be made of this prize, as the commission must not expect to get any more satisfactory means of dealing with the pest than those already proposed, that are based on experience and sound scientific principles. By this we mean that the treatment of any such underground pest that has so varied a life-history must necessarily involve a given amount of time, money, and labor, regardless of the particular substance or means employed; and to look for a 'remedy' that shall involve neither is to look for the impossible, — the miraculous. Those who were the first to suggest and prove the value of resistant American vines, those who established the value of submersion and bisulphide of carbon, and those who have helped toward a sound knowledge of the insect's life-history, — all deserve recognition.

The methods recommended by the commission for the year 1883, aside from the use of the American vines, are the old ones of submersion, bisulphide of carbon, and sulphocarbonate of potassium.

C. V. RILEY.

CALIFORNIA AGRICULTURE.

University of California. College of agriculture. Report of the professor in charge to the president, being a part of the report of the regents of the university. 1882. Sacramento, State, 1883. 179 p. 8°.

THIS report includes the general report of the professor in charge, E. W. Hilgard, to the president, and four appendices, or special reports: viz., report and discussion of work in the agricultural laboratory, by E. W. Hilgard; report on instruction given, and culture experiments, by Charles H. Dwinelle; report of W. G. Klee, gardener in charge of the experimental grounds, on fruit and miscellaneous cultures; report of work done in the viticultural laboratory, with record and discussion of results, by F. W. Morse.

In his general report, Professor Hilgard reiterates the opinion which he has advanced in another publication (*Atlantic monthly*, April

and May, 1882), that, in view of the present wide-spread indifference to agricultural education, "the work of an experiment-station . . . is the key to the situation, so far as the utility and public appreciation of the College of agriculture is concerned." In accordance with this view, work appropriate to an experiment-station has been carried on, in addition to the work of instruction, to as great an extent as the time and means at command permitted; and the four appendices to the general report contain the results of the investigations which have been made.

The work of the agricultural laboratory has consisted chiefly of an examination of the more important and widely distributed soils of the state. These are classified geographically; and chemical and mechanical analyses of several representative samples of each class have been made, from the results of which very important conclusions are drawn as to the present and prospective value and the proper treatment of these soils. Professor Hilgard is far from falling into the old erroneous belief that chemical analysis can be depended upon to show the immediate deficiencies of a soil; but he holds that it may furnish important information as to the amount and kind of reserve matters which it contains, and afford a guide to a rational method of cultivation; and in his hands it certainly seems to justify the claims made for it.

One of the most interesting portions of the horticultural report in appendix III. is that devoted to the vineyard, where are given the results of experiments on grafting the European grape (*Vitis vinifera*) upon a native Californian species (*Vitis californica*). The conclusion is reached, that "it must be considered definitely proved that the *Vitis californica* is well adapted as a grafting stock for a large number of the varieties of *Vitis vinifera*." The importance of this fact, of course, lies in the greater power of resistance to Phylloxera possessed by the American species. Experiments upon the latter point are now in progress with grafted specimens.

The account of the viticultural work includes some observations on the occurrence and development of Phylloxera, but is chiefly occupied with the results of the experiments on wine-making, which, though still incomplete, and though necessarily executed on a small scale, furnish much valuable information as to the character of the wine to be obtained from different varieties of grapes, and from grapes grown in different regions of the state. They can hardly fail, if continued, to exert a most

beneficial influence on the advance of this industry in California, and may fulfil the hopes of their authors by leading to the establishment of definite and reliable brands of California wines.

The whole report, while dealing largely with

questions of local interest, affords at the same time an admirable illustration of the advantage accruing to agriculture from the application of high scientific attainments to the investigation of its problems.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Semi-diameter of the moon.—Professor H. M. Paul, formerly assistant at the U. S. naval observatory, gives the results of two occultations of the *Pleiades* group by the moon, observed by himself to determine the *occultation semi-diameter of the moon*, and also the corrections to the right ascension, declination, and parallax of the moon, these being necessarily involved with the semi-diameter. The occultations occurred on July 6, 1877, and Sept. 6, 1879, and were observed with the 9.6-inch equatorial at the Washington observatory. The relative positions adopted for the stars were those of Wolf with proper motions from comparison with Bessel, and the general proper motion of the group as given by Newcomb. The observations of 1877 were poorly placed for a determination of the correction to the semi-diameter, but those of 1879 give a much more reliable result. From the latter (fourteen in all), the resulting correction to Hansen's mean semi-diameter ($15' 33''.47$) is $-1'.69 \pm 0''.12$; and the resulting value is, therefore, *semi-diameter* = $15' 1''.78 \pm 0''.12$. He gives also the results of Airy's determination from two hundred and ninety-six scattered observations, from 1830 to 1860. From the immersions and emersions at the dark limb, the resulting values are larger by $0''.9$ and $0''.5$ than those given by Paul, and, from immersions and emersions at the bright limb, Airy's results are larger by $2''.3$ and $4''.4$; while the probable error of a single observation and of the final result is in all cases greatly in excess of those obtained by Paul. Mr. Paul concludes that the best way to observe the actual occultation at the bright limb is to use as high a magnifying power as possible, so as to obtain a decided difference of color between the star and the moon's limb. Neither set of occultations observed by Paul gives any evidence of deviation of the moon's limb from a perfect circle. — (*Rep. Wash. obs., 1879, appendix ii.*) M. MEN. [1103]

ENGINEERING.

Swelled rifle-barrels.—A board of officers, with Capt. Greer as president, has tested a lot of rifles at the Springfield armory to determine the cause of the bulging of the barrel, which occasionally occurs in practice. They find it due to the fact that the muzzle has been stopped by sand, caused by resting the muzzle in wet sand, or in dry sand after the gun has become foul from firing. This arrests the passage of the ball, so that the pressure is increased at the point of swelling. It is curious that sand produced this result where wooden plugs, driven in tightly and swelled by steam, failed to do so. — (*Ord. notes, U.S.A., no. 238, Feb. 1.*) C. E. M. [1104]

Strength of explosives.—Gen. Abbot has extended his investigations to tonite, California gun-cotton, and rackarock. The first consists of 52.5 parts of gun-cotton and 47.5 parts of barium nitrate. The second is gun-cotton pulverized, and containing 24

per cent of moisture. The dry gun-cotton analyzed 89.6 per cent insoluble trinitrocellulose and 10.4 per cent soluble gun-cotton. This is 7 per cent above the standard required by the British government. The rackarock is composed of potassium chlorate and nitrobenzol. The substances are kept separate until needed for use, when the chlorate is dipped in the liquid until it has absorbed enough of it. Gen. Abbot found the relative efficiency in a horizontal plane for tonite, as compared with dynamite No. 1, to be 0.81 for the dry compressed state, and 0.85 for the damp uncompressed state, or 0.83 as the average value. It thus stands just below gun-cotton (0.87). Rackarock gives 0.86. The California gun-cotton was found equal to the best English. In a note, he calls attention to the spontaneous decomposition of explosive gelatine into cellulose and free nitro-glycerine, with the evolution of nitrous fumes, while in store during the winter and spring. — (*Prof. papers corps eng., U.S.A., no. 23, add. i.*) C. E. M. [1105]

Composition of steel.—Professor Abel has continued his researches on steel; and his experiments with cold-rolled steel of a *particular composition* confirm the view that the carbon exists in it in the form of a carbide which has the formula Fe_3C , or some multiple of that formula. Whether this carbide varies in composition in different descriptions of steel which are in the same condition of preparation remains to be demonstrated; but the preliminary experiments with small specimens of cold-rolled, annealed, or hardened steel, appeared to warrant the belief that the condition of the carbide in the metal is affected to such an extent, by the process of hardening, as more or less completely to counteract its power to resist the decomposing effect of such an oxidizing agent as chromic-acid solution. — (*Proc. inst. mech. eng., Jan., 1883.*) C. E. M. [1106]

CHEMISTRY.

(Analytical.)

Preparation of hydric sulphide from coal-gas.—When coal-gas is passed through boiling sulphur, I. Taylor finds that nearly all the hydrogen (forty to fifty per cent) is converted into hydric sulphide. He states that this is a convenient method for the preparation of hydric sulphide for laboratory use. — (*Chem. news, xlvii, 145.*) C. F. M. [1107]

Hydric peroxide as a reagent in chemical analysis.—A. Classen and O. Bauer find that the great oxidizing power of hydric peroxide may be made available in many quantitative determinations which depend upon oxidation. Roth & Co. of Berlin manufacture a three or four per cent solution, acidified with hydrochloric or sulphuric acid, as may be desired. In an ammoniacal solution, hydric peroxide oxidizes hydric sulphide completely. This reaction affords a convenient and extremely accurate means for the determination of hydrochloric, hydrobromic, or hydriodic acid, in presence of hydric sulphide.